added with ethylene pressure and the reactor was pressurized with 113 psi (779 kPa) of ethylene. The polymerization was continued for 40 minutes while maintaining the reactor at 90° C. and 113 psi (779 kPa) by constant ethylene flow. The reaction was stopped by rapid cooling and vented. 11.9 g of polyethylene was obtained (FI=no flow, activity=311 g polyethylene/mmol catalyst·atm·h).

Example 13

Slurry-Phase Ethylene Polymerization with Catalyst D

Polymerization was performed in the slurry-phase in a 1-liter autoclave reactor equipped with a mechanical stirrer, an external water jacket for temperature control, a septum inlet and vent line, and a regulated supply of dry nitrogen and ethylene. The reactor was dried and degassed at 160° C. Isobutane (400 mL) was added as a diluent and 0.7 mL of a 25 weight percent trioctyl aluminum solution in hexane was added as a scavenger using a gas tight syringe. The reactor was heated to 90° C. 0.200 g of finished Catalyst D was added with ethylene pressure and the reactor was pressurized with 130 psi (896 kPa) of ethylene. The polymerization was continued for 30 minutes while maintaining the reactor at 90° C. and 130 psi (896 kPa) by constant ethylene flow. The reaction was stopped by rapid cooling and vented. 29.1 g of polyethylene was obtained (FI=no flow, activity=881 g polyethylene/mmol catalyst·atm·h).

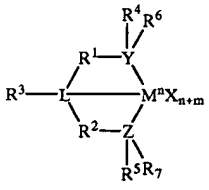
From the data presented above under similar conditions the Group 15 containing metal catalyst compound having the substituted hydrocarbon leaving group, preferably the alkyl substituted with an aryl group of the invention has a much higher productivity than the same compound having a halogen.

While the present invention has been described and illustrated by reference to particular embodiments, those of ordinary skill in the art will appreciate that the invention lends itself to variations not necessarily illustrated herein. For example, it is contemplated that two or more Group 15 containing catalyst compositions of the invention can be used. Also it is contemplated that a Group 15 containing metal catalyst compound having a substituted alkyl leaving group of the invention can be used with a Group 15 containing metal catalyst compound having halogen leaving groups. For this reason, then, reference should be made solely to the appended claims for purposes of determining the true scope of the present invention.

I claim:

1. A process for polymerizing olefin(s) in the presence of a catalyst system comprising a Group 15 containing bidentate or tridentate ligated metal catalyst compound, wherein the process is conducted at a temperature from between 50° C. to 200° C., and wherein the catalyst compound is represented by the formulae:

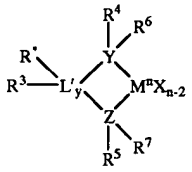
Formula (I)



or

-continued

Formula (II)



wherein M is metal;

each X is an aryl substituted alkyl leaving group;

y is 0 or 1;

n is the oxidation state of M;

m is the formal charge of Y, Z and L or of Y, Z, and L';

L is a Group 15 element;

L' is a Group 15 element or Group 14 containing group;

Y is a Group 15 element;

Z is a Group 15 element;

R_1 and R^2 are independently a C_1 to C_{20} hydrocarbon group, a heteroatom containing group having up to twenty carbon atoms, silicon, germanium, tin, lead, or phosphorus;

R^3 is absent, a hydrocarbon group, hydrogen, a halogen, or a heteroatom containing group;

R^4 and R^5 are independently an alkyl group, an aryl group, a substituted aryl group, a cyclic alkyl group, a substituted cyclic alkyl group, a cyclic arylalkyl group, a substituted cyclic arylalkyl group or a multiple ring system;

R^1 and R^2 may be interconnected to each other, and/or R^4 and R^5 may be interconnected to each other;

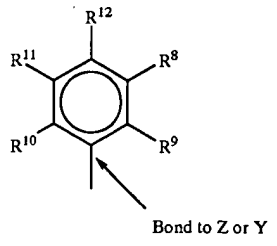
R^6 and R^7 are independently absent, hydrogen, an alkyl group, halogen, heteroatom or a hydrocarbyl group; and

R^* is absent, hydrogen, a Group 14 atom containing group, a halogen, or a heteroatom containing group.

2. The process of claim 1 wherein R^1 and R^2 are selected from the group consisting of a C_1 to C_{20} hydrocarbon group, a heteroatom containing group, silicon, germanium, tin, lead, and phosphorus.

3. The process of claim 1 wherein L or L' may also be bound to nothing, a hydrogen, a Group 14 atom containing group, a halogen, or a heteroatom containing group, and wherein each of the two Group 15 atoms are also bound to a cyclic group and may optionally be bound to hydrogen, a halogen, a heteroatom, a hydrocarbyl group, or a heteroatom containing group.

4. The process of claim 1 wherein R^4 and R^5 are represented by the formula:



wherein R^8 to R^{12} are each independently hydrogen, a C_l to C_{40} alkyl group, a halide, a heteroatom, or a heteroatom containing group containing up to 40 carbon atoms, wherein

any two R groups may form a cyclic group and/or a heterocyclic group, and wherein the cyclic groups may be aromatic.

5. The process of claim 4 wherein R^9, R^{10} and R^{12} are independently a methyl, ethyl, propyl or butyl group and X is a substituted aryl group having greater than 10 carbon atoms.

6. The process of claim 4 wherein R^9, R^{10} and R^{12} are methyl groups, and R^8 and R^{11} are hydrogen and X is a alkyl substituted with an aryl group.

7. The process of claim 4 wherein L, Y, and Z are nitrogen, R^1 and R^2 are a hydrocarbon radical, R^3 is hydrogen, and R^6 and R^7 are absent.

8. The process of claim 1 wherein L and Z are independently nitrogen, L' is a hydrocarbyl radical, and R^6 and R^7 are absent.

9. The process of claim 1 wherein the catalyst system is supported on a carrier.

10. The process of claim 1 wherein the process is a continuous gas phase process.

11. The process of claim 1 wherein the process is a continuous slurry phase process.

12. The process of claim 1 wherein the olefin(s) is ethylene or propylene.

13. The process of claim 1 wherein the olefins are ethylene and at least one other monomer having from 3 to 20 carbon atoms.

14. The process of claim 1 wherein the catalysts system further comprises an activator.

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